



EBOLA VIRUS DISEASE

Ebola Virus Disease (EVD) is one of numerous Viral Hemorrhagic Fevers. It is a severe, often fatal disease (50%-90% fatality) in humans and nonhuman primates (such as monkeys, gorillas, and chimpanzees). In 2014, West African countries (Guinea, Liberia, and Sierra Leone) have experienced the largest outbreak of EVD.

1. **Agent:** Ebola HF is caused by infection with a virus of the family *Filoviridae*, genus *Ebolavirus*

2. **Identification:**

a. **Symptoms:** Initial signs and symptoms are nonspecific and may include fever, chills, myalgias, and malaise. Fever, anorexia, and weakness are the most common signs and symptoms. Patients may develop a diffuse erythematous maculopapular rash by day 5 to 7 (usually involving the face, neck, trunk, and arms) that can desquamate. Patients can progress from the initial non-specific symptoms after about 5 days to develop gastrointestinal symptoms such as severe watery diarrhea, nausea, vomiting and abdominal pain. Other symptoms such as chest pain, shortness of breath, headache or confusion, may also develop. Patients often have conjunctival injection. Seizures may occur, and cerebral edema has been reported. Bleeding is not universally present but can manifest later in the course as petechiae, ecchymosis/bruising, or oozing from venipuncture sites and mucosal hemorrhage. Frank hemorrhage is less common. Pregnant women may experience spontaneous miscarriages.

b. **Differential Diagnosis:** Due to these nonspecific symptoms particularly early in the course, EVD can often be confused with other more common infectious diseases such as malaria, typhoid fever, meningococcemia, and other bacterial infections (e.g., pneumonia).

c. **Diagnosis:** In the early stages of case investigation, a case is defined by meeting the CDC's case definition.

(<http://www.cdc.gov/vhf/ebola/hcp/case-definition.html>)

Person Under Investigation (PUI)

A person who has both consistent symptoms and risk factors as follows:

1) Elevated body temperature or subjective fever or symptoms, including severe headache, fatigue, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; **AND**

2) Epidemiologic risk factors within the past 21 days before the onset of symptoms (see Pages 3-5)

A PUI classification will change if laboratory testing determines PUI to be negative ("not a case") or positive ("confirmed case") for EVD.

Confirmed Case

A PUI with laboratory confirmed diagnostic evidence of Ebola virus infection.

3. **Incubation:** Usually 8-10 days, (range 2 to 21 days).

4. **Reservoir:** Unknown. However, on the basis of available evidence and the nature of similar viruses, researchers believe that the virus is zoonotic (animal-borne) with bats being the most likely reservoir. Four of the five subtypes occur in an animal host native to Africa.

5. **Source:** Blood, sweat, vomit, saliva, urine, feces, semen, breast milk of EVD cases. Infected bats, rodents, or primates from disease-endemic areas.

6. **Transmission:** Direct contact (through broken skin or mucous membranes) with body fluids from an EVD infected person, such as blood, sweat, vomit, saliva, urine, feces, semen, or through contact with contaminated objects (e.g., needles). Direct handling of bats, rodents, or primates from disease-endemic areas.



7. **Communicability:** A person with EVD becomes infectious to others at the onset of symptoms. Once someone recovers from Ebola, they can no longer spread the virus. However, Ebola virus has been found in semen for up to 3 months. People who recover from Ebola are advised to abstain from sex or use condoms for 3 months. There is not enough evidence to provide guidance on when it is safe to resume breastfeeding after a mother's recovery, unless her breast milk can be shown to be Ebola virus-free by laboratory testing.
8. **Specific treatment:** Standard treatment for EVD is limited to treating the symptoms as they appear and supportive care, such as balancing the patient's fluids and electrolytes, maintaining their oxygen status and blood pressure, and treating them for any complicating infections.
9. **Immunity:** People who recover from Ebola infection develop antibodies that last for at least 10 years, possibly longer. It isn't known if people who recover are immune for life or if they can become infected with a different species of Ebola.

REPORTING PROCEDURES

1. **Report any case or suspect cases by telephone immediately** (Title 17, Section 2500. *California Code of Regulations*) to:
 - a. LA County Department of Public Health (DPH) Acute Communicable Disease Control (ACDC) Program at (213) 240-7941. Physicians at ACDC are available 24 hours/day for consultation.
2. ACDC will notify the:
 - a. CDC Emergency Operations Center at (770) 488-7100.
 - b. CA Dept. of PH Division of Communicable Disease Control (CDPH DCDC) by calling the Duty Officer at (510) 620-3434/After-hours pager (800) 971-9631.
 - c. Appropriate ACDC staff.
 - d. LAC DPH Public Health Lab.

1. Report Form:

- [Ebola Virus Disease Intake Checklist \(for internal ACDC use\)](#)
- A. [Ebola Virus Disease Screening Form \(for internal ACDC use\)](#)
- B. [VIRAL HEMORRHAGIC FEVER CASE REPORT \(CDPH 8527\)](#)
- C1. [Ebola Virus Disease Contact Investigation Worksheet](#)
- C2. [Ebola Virus Disease Contact Listing Form](#)
- D. [Ebola Virus Disease Exposure Risk Assessment Form](#)
- E. [Ebola Virus Disease Exposure Daily Symptom Monitoring Log](#)
- F. [Ebola Symptom Card and 21-DAY Tracking Log](#)
- G. Ebola Virus Disease Movement Restriction Assessment Form (for internal use only)

Upon consultation with the reporting clinician, the AOD is to complete both the EVD intake/checklist and the screening form. AOD is to report to Chief or Deputy Chief of ACDC to determine actions to follow.

2. Epidemiological Data:

- a. Travel to EVD-affected areas (as of 11/3/14: West African countries of Guinea, Liberia, Sierra Leone) within 21 days of onset of symptoms.
- b. Employment in a healthcare facility or other healthcare setting in the EVD affected areas.
- c. Direct contact with body fluids of a known EVD patient.
- d. Caretaker or household member of a person infected with EVD.
- e. Laboratory worker handling specimens from an EVD patient.



- f. Direct exposure to human remains of a person with EVD without wearing appropriate personal protection equipment.
- g. Direct handling of bats, rodents, or primates from the EVD affected areas.

CONTROL OF CASES & MONITORING OF PERSONS WHO MAY HAVE BEEN EXPOSED TO EVD

Investigate on the day of report.

CASE (PUI and Confirmed):

1. If a diagnosis of Ebola is being considered, the patient should be isolated in a single room (with a private bathroom), and healthcare personnel should follow standard, contact, and droplet precautions, including the use of appropriate personal protective equipment (PPE). If any aerosolizing procedures are needed, place patient in an airborne isolation room. Contact ACDC immediately.
2. Prior to interviewing the PUI or case for their potentially exposed contacts, determine the level of PPE required based on the clinical presentation of the PUI or case. If unable to interview the PUI or case directly, obtain the information by phone or from another person that is familiar with the PUI or case. Obtain the names of all persons who may have had close, direct, and unprotected (not wearing protective clothing) contact with them during the course of their illness and prior to the implementation of isolation precautions (e.g., emergency medical services, emergency room personnel, family/household members, other patient contacts.. **(FORM C1: Ebola Virus Disease Contact Investigation Worksheet and FORM C2: Ebola Virus Disease Contact Listing Form)**
3. Maintain a log of all staff and visitors entering the patient room. Ensure only necessary personnel enter the patient room. Keep log of all staff and visitors (with contact numbers) that may have had interaction/contact with the case prior to proper isolation of patient.

4. Maintain a log of all staff collecting and handling specimens from the suspected EVD patient. Healthcare and laboratory personnel should follow established standards and protocols compliant with the OSHA bloodborne pathogen standard for blood and other potentially infectious material.
5. Utilize PPE at all times when in patient rooms or handling patient specimens. **At all times:** gown or coverall (impermeable or fluid resistant), two pairs of gloves, powered air purifying respirator (PAPR) or N95 respirator in combination with surgical hood and full face shield, boot or shoe covers (impermeable or fluid resistant) and apron (impermeable or fluid-resistant).

Refer to CDC guidelines for Guidance on Personal Protective Equipment To Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On (Donning) and Removing (Doffing): <http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html>

6. Prior to discharge: contact LA County Department of Public Health (DPH) Acute Communicable Disease Control (ACDC) Program at (213) 240-7941. Physicians at ACDC are available 24 hours/day for consultation.

CONTACTS AND EXPOSURE RISK LEVELS:

Contact identification and follow-up should occur for all PUI where there is a high index of suspicion of EVD and diagnostic testing is indicated, as well as for all confirmed EVD cases (both alive and dead). If laboratory testing determines that a case is ruled out ("not a case"), contact identification and follow-up can cease.

As of 10/27/14, the CDC provided guidelines for classifying contacts based on their level of risk exposure:

Each contact should be located and interviewed to confirm exposure risk and determine presence or absence of symptoms. **(FORM D: Ebola Virus Disease Exposure Risk Assessment Form)**



1. **High Risk – direct contact of infected body fluids through:**

- Needle stick, or splashes to eyes, nose, or mouth
- Getting body fluids directly on skin
- Handling body fluids, such as in a laboratory, without wearing PPE or following recommended safety precautions
- Touching a dead body without correctly wearing PPE in a country with widespread Ebola transmission (In countries with widespread Ebola transmission, a person's cause of death is not always known. Therefore, touching any dead body in one of these countries is considered a high risk exposure.)
- Living with and providing direct care for a person with Ebola while person was symptomatic.

a. Symptomatic:

- Clinical criteria, which includes: fever of $\geq 99.5^{\circ}\text{F}/37.5^{\circ}\text{C}$, OR any of the following symptoms: severe headache, weakness/fatigue, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained bruising or bleeding.
- Call ACDC doctor on call (a.k.a., AOD) at 213-240-7941 immediately for consultation and to arrange safe transport to a healthcare facility for Ebola evaluation.
- Admit and isolate patient for medical examination, perform Ebola virus testing, and conduct contact tracing.
- Health Officer Order of Isolation may be considered if necessary to ensure compliance.

b. Asymptomatic:

- Health Officer Order to Restrict Movement up to and including Strict Quarantine in accordance with CDC guidelines is required.
- DPH will conduct a face-to-face visit (two times per day), for fever check and symptom review for 21 days from the date of last exposure with EVD. **DPH completes FORM E: Ebola Virus Disease Exposure Daily Symptom Monitoring Log.**
- Travel restrictions: no travel on any public conveyances (e.g., airplane,

ship, long-distance bus, or train), even if not showing symptoms.

- Travel, if permitted by DPH, should occur only by non-commercial conveyances while not interrupting DPH twice daily face-to-face monitoring.
- Exclusion from workplaces for the duration of the public health order.
- Exclusion from public places (e.g., shopping centers, movie theatres) and congregate gatherings.
- Non-congregate public activities while maintaining a 3-foot distance from others may be allowed (e.g., jogging in a park) at DPH discretion.
- Notify ACDC immediately if fever or other symptoms develop at 213-240-7941.

2. **Some risk:**

- In countries with widespread Ebola transmission: direct contact (while wearing appropriate PPE) with a person with Ebola while the person was symptomatic
- Close contact with a person with Ebola while the person was symptomatic such as in a household, health care facility, or the community (no PPE worn). Close contact means being within 3 feet of the person with Ebola for a long time >1 hour (consult with ACDC if needed; case-by-case upon assessment by ACDC) without wearing PPE.

a. Symptomatic:

- Clinical criteria, which includes: fever of $\geq 99.5^{\circ}\text{F}/37.5^{\circ}\text{C}$, OR any of the following symptoms: severe headache, weakness/fatigue, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained bruising or bleeding.
- Call ACDC doctor on call (a.k.a., AOD) at 213-240-7941 immediately for consultation and to arrange safe transport to a healthcare facility for Ebola evaluation.
- Admit and isolate patient for medical examination, perform Ebola virus testing, and conduct contact tracing.
- Health Officer Order of Isolation may be considered if necessary to ensure compliance.



b. Asymptomatic:

- Health Officer Order Restricting Movement will be determined based on a case-by-base assessment (**Health Officer or Designee Completes Form G: Ebola Virus Disease Movement Restriction Assessment Form**).
- DPH will conduct a face-to-face visit (one time each day), plus one telephone follow-up daily for fever check and symptom review for 21 days from the date of last exposure with EVD. **DPH completes FORM E: Ebola Virus Disease Exposure Daily Symptom Monitoring Log.**
- Travel restrictions: no travel on any public conveyances (e.g., airplane, ship, long-distance bus, or train), unless approved by DPH.
- Travel, if permitted by DPH, should occur only by non-commercial conveyances while not interrupting DPH twice daily monitoring.
- Restrictions from working or attending school will be determined based on a case-by-case assessment.
- Exclusion from public places (e.g., shopping centers, movie theatres) and congregate gatherings based on a case-by-base assessment.
- Non-congregate public activities while maintaining a 3-foot distance from others may be permitted (e.g., jogging in a park) at DPH discretion.
- Notify ACDC immediately if fever or other symptoms develop at 213-240-7941.

3. Low risk (but not zero):

- Having been in a country with widespread Ebola transmission within the previous 21 days and having no known exposure.
- Being in the same room for a brief period of time (without direct contact) with a person with Ebola while the person was symptomatic.
- Having brief direct contact (e.g., shaking hands), while not wearing appropriate PPE, with a person with Ebola while the person was in the early stage of disease.
- In countries without widespread Ebola virus transmission (e.g., United States):

direct contact while using appropriate PPE with a person with Ebola while the person was symptomatic.

- Travel on an aircraft with a person sick with Ebola.

a. Symptomatic:

- Clinical criteria, which includes: fever of $\geq 99.5^{\circ}\text{F}/37.5^{\circ}\text{C}$, OR any of the following symptoms: severe headache, weakness/fatigue, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained bruising or bleeding.
- Call ACDC doctor on call (a.k.a., AOD) at 213-240-7941 for consultation.
 - Symptoms should be assessed over the telephone to determine if contact needs immediate safe transport to a healthcare facility for Ebola evaluation.
 - If symptoms assessed over the telephone are not clinically consistent with Ebola virus disease (e.g., runny nose, sore throat), an Area Medical Director (AMD) may further evaluate the contact's symptoms in consultation with ACDC and make recommendations.
 - If person needs to be transported to a healthcare facility for Ebola evaluation, admit and isolate patient for medical examination, perform Ebola virus testing, and contact tracing.
 - Health Officer Order of Isolation may be considered if necessary to ensure compliance.

b. Asymptomatic:

- No restrictions on travel, work, public conveyance, or congregate gathering.

For Healthcare Workers and Travelers on Aircrafts:

- For healthcare workers caring for sick Ebola patients in the United States while wearing appropriate



PPE correctly, and for travelers on an aircraft who were seated within 3 feet, DPH will conduct a face-to-face visit (one time each day), plus one telephone follow-up daily for fever check and symptom review for 21 days from the date of last exposure with EVD. **DPH completes FORM E: Ebola Virus Disease Exposure Daily Symptom Monitoring Log**

- For all other contacts:
 - The contact will self-monitor for fever and symptoms two times per day for 21 days from the date of last exposure with an EVD case or country with widespread Ebola transmission. Provide person with **FORM F: Ebola Symptom Card and 21-DAY Tracking Log**.
 - DPH will monitor contact (by phone) daily to obtain fever and symptom status report. **DPH completes FORM E: Ebola Virus Disease Exposure Daily Symptom Monitoring Log.**
- Notify ACDC immediately if fever or other symptoms develop at 213-240-7941.
- If a healthcare worker in a U.S. healthcare facility who was believed to be wearing PPE correctly is diagnosed with Ebola, and no known breach was identified, then all other healthcare workers taking care of the Ebola patient in that facility will be considered in the **High Risk** category.

4. No risk

- Contact with an asymptomatic person who had contact with a person with Ebola.
- Contact with a person with Ebola BEFORE the person was showing symptoms.
- Having been more than 21 days previously in a country with widespread Ebola virus transmission.
- Having been in a country where there is no widespread Ebola transmission (e.g.,

the United States), and having no other exposures to Ebola.

- a. Symptomatic:
 - These people might need to have a medical examination for other diseases (not Ebola).
- b. Asymptomatic:
 - No public health follow-up.

Isolation and Quarantine

DPH will implement isolation and quarantine measures as needed to assure the public's health. ACDC Program Director or authorized designee may assume responsibility for initiation of H-455 Request for Legal Intervention and contact Chief, Public Health Investigation (PHI). DPH AOD will determine if legal orders are necessary, coordinate with the DPH Health Officer if available, and contact LAC DPH Chief PHI for execution. Refer to the LAC DPH Legal Order Manual, page 12, 7f, for full guidance.

DIAGNOSTIC PROCEDURES

Notify the LAC DPH Public Health Lab prior to any testing for EVD (562-658-1360).

The Public Health Laboratory is authorized to perform molecular testing for Ebola Virus Disease. Public health laboratory staff will assist in proper Category A specimen packaging and transport of specimens to the laboratory for testing. All molecular results are confirmed by CDC.

Required specimens for molecular testing are two (2) blood samples collected in plastic lavender top (EDTA) vacutainer tubes. Each tube must contain a minimum of 4 mL blood.

Do not submit specimens in glass containers or attempt to aliquot. Specimens should be double bagged, stored at 2-8°C, and transported on cold pack in Category A packaging to the Public Health Lab. Courier should not be used for transport of suspected Ebola specimens. The Public Health Lab will arrange for transport.

Standard labeling of specimens with a minimum of two patient identifiers and collection date should be followed. Forms required for Ebola diagnostic testing at the Public Health Laboratory include:



- 1) Public Health Laboratory Test Request Form
- 2) CDC Form 50.34
- 3) CDC Viral Special Pathogens Branch Test Request Form

Specimens other than blood may be submitted for additional testing at CDC upon consult and approval.

Refer to CDC website for the Interim Guidance for Specimen Collection, Transport, Testing, and Submission for Patients with Suspected Infection with Ebola Virus Disease:

<http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html>

Within a few days of symptom onset:

- Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing
- IgM ELISA
- Blood for Polymerase Chain Reaction (PCR)
- Blood for Virus isolation

Later in disease course or after recovery:

- Blood for IgM and IgG antibodies

Retrospectively in deceased patients:

- Tissue for Immunohistochemistry testing
- Blood for PCR
- Blood for Virus isolation

PREVENTION-EDUCATION

1. Reinforce the importance of ensuring strict infection control practices in healthcare facilities and among healthcare and other ancillary personnel.

For guidance refer to the Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Hemorrhagic Fever in U.S. Hospitals on the CDC website:

<http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>

2. Regarding Environmental Infection Control for hospitals taking care of patients with suspected or confirmed EVD:
 - a. Environmental services staff must wear recommended PPE including,

at a minimum, disposable gloves, gown (fluid resistant/ impermeable), eye protection (full face shield), and facemask to protect against direct skin and mucous membrane exposure of cleaning chemicals, contamination, and splashes or spatters during environmental cleaning and disinfection activities.

- b. Use a U.S. Environmental Protection Agency (EPA)-registered hospital disinfectant with a label claim for a non-enveloped virus (e.g., norovirus, rotavirus, adenovirus, poliovirus) to disinfect environmental surfaces in rooms of patients with suspected or confirmed Ebola virus infection
- c. Avoid contamination of reusable porous surfaces that cannot be made single use.
- d. To reduce exposure among staff to potentially contaminated textiles (cloth products) while laundering, discard all linens, non-fluid-impermeable pillows or mattresses, and textile privacy curtains as a regulated medical waste.
- e. For full guidance, see:
<http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>

3. Educate healthcare staff on the importance of strict adherence to proper use of standard, contact, droplet and airborne precautions.
4. Utilize Personal Protective Equipment **At all times:** gown or coverall (impermeable or fluid resistant), two pairs of gloves, powered air purifying respirator (PAPR) or N95 respirator in combination with surgical hood and full face shield, boot or shoe covers (impermeable or fluid resistant) and apron (impermeable or fluid-resistant).

Healthcare facilities should be providing ongoing training on correct use of PPE for their healthcare workers with special emphasis on careful and meticulous doffing procedures, including a trained observer to monitor for strict infection control practice, and eliminate any possible contamination, self-inoculation, and potential secondary cases of Ebola in healthcare workers.



5. Educate healthcare workers on the safe specimen handling for routine laboratory diagnostics.

- a. Minimize routine blood specimen draws and specimen handling.
- b. Clean equipment according to manufacturer's instructions.

Refer to CDC guidance for more information and Guidance for Specimen Collection, Transport, Testing, and Submission for Patients with Suspected Infection with Ebola Virus Disease:

<http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html>

Printable Fact sheet:

<http://www.cdc.gov/vhf/ebola/pdf/ebola-lab-guidance.pdf>

6. General education for Ebola prevention:

- a. There are no FDA-approved vaccines for EVD
- b. Wash hands often with soap and water or use an alcohol-based hand sanitizer.
- c. Do NOT touch the blood or body fluids (e.g., urine, feces saliva, vomit, sweat and semen) of people who are sick.
- d. Do NOT handle items that may have come in contact with a sick person's blood or body fluids, such as clothes, bedding, needles, or medical equipment.
- e. Do NOT touch the body of someone who has died of Ebola.

- 2) Identify, Isolate, Inform: Ambulatory Care Evaluation of Patients with Possible Ebola Virus Disease (11/1/14)
<http://www.cdc.gov/vhf/ebola/pdf/ambulatory-care-evaluation-of-patients-with-possible-ebola.pdf>

- 3) Interim Guidance for Environmental Control in Hospitals for Ebola Virus (10/28/14)
<http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>

- 4) Ebola-Associated Waste Management
<http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>

- 5) Questions and Answers about CDC's Ebola Monitoring & Movement Guidance (11/1/14)
<http://www.cdc.gov/vhf/ebola/exposure/qa-monitoring-and-movement-guidance.html>

- 6) Infographic: How is Ebola Spread (11/1/14)
<http://www.cdc.gov/vhf/ebola/pdf/infections-spread-by-air-or-droplets.pdf>

OTHER RESOURCES:

- 1) Web-based PPE Training. Guidance for Donning and Doffing Personal Protective Equipment (PPE) During Management of Patients with Ebola Virus Disease in U.S. Hospitals (10/31/14)
<http://www.cdc.gov/vhf/ebola/hcp/ppe-training/index.html>